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 The Government of the United States of America  
 as represented by The Secretary of the  
 Department of Health and Human Services

<120> Immunogenic Peptides of XAGE-1

<130> 015280-485100PC

<140> WO PCT/US04/41639

<141> 2004-12-13

<150> US 60/529,025

<151> 2003-12-12

<160> 45

<170> PatentIn Ver. 2.1

<210> 1

<211> 246

<212> DNA

<213> Homo sapiens

<220>

<223> xage-1 p9, 9kD protein expressed from XAGE-1 gene

<220>

<221> CDS

<222> (1)..(246)

<223> xage-1 p9

<400> 1

atg gag agc ccc aaa aag aag aac cag cag ctg aaa gtc ggg atc cta	48
Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile Leu	
1 5 10 15	
cac ctg ggc agc aga cag aag aag atc agg ata cag ctg aga tcc cag	96
His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser Gln	
20 25 30	
tgc gcg aca tgg aag gtg atc tgc aag agc tgc atc agt caa aca ccg	144
Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr Pro	
35 40 45	
ggg ata aat ctg gat ttg ggt tcc ggc gtc aag gtg aag ata ata cct	192
Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile Pro	
50 55 60	
aaa gag gaa cac tgt aaa atg cca gaa gca ggt gaa gag caa cca caa	240
Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro Gln	
65 70 75 80	
gtt taa	246
Val	

<210> 2  
 <211> 81  
 <212> PRT  
 <213> Homo sapiens

<220>  
 <223> xage-1 p9

<400> 2  
 Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile Leu  
           1                  5                  10                  15  
 His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser Gln  
                   20                  25                  30  
 Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr Pro  
                   35                  40                  45  
 Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile Pro  
           50                  55                  60  
 Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro Gln  
           65                  70                  75                  80  
 Val

<210> 3  
 <211> 441  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <223> xage-1 p16, 16.3 kD protein expressed from XAGE-1  
           gene

<220>  
 <221> CDS  
 <222> (1) .. (441)  
 <223> xage-1 p16

<400> 3  
 atg ctc ctt tgg tgc cca cct cag tgc gca tgt tca ctg ggc gtc ttc 48  
 Met Leu Leu Trp Cys Pro Pro Gln Cys Ala Cys Ser Leu Gly Val Phe  
           1                  5                  10                  15  
 cca tcg gcc cct tcg cca gtg tgg gga acg cgg cgg agc tgt gag ccg 96  
 Pro Ser Ala Pro Ser Pro Val Trp Gly Thr Arg Arg Ser Cys Glu Pro  
                   20                  25                  30  
 gcg act cgg gtc cct gag gtc tgg att ctt tct ccg cta ctg aga cac 144  
 Ala Thr Arg Val Pro Glu Val Trp Ile Leu Ser Pro Leu Leu Arg His  
                   35                  40                  45  
 ggc gga cac aca caa aca cag aac cac aca gcc agt ccc agg agc cca 192  
 Gly Gly His Thr Gln Thr Gln Asn His Thr Ala Ser Pro Arg Ser Pro  
           50                  55                  60  
 gta atg gag agc ccc aaa aag aag aac cag cag ctg aaa gtc ggg atc 240  
 Val Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile  
           65                  70                  75                  80

cta cac ctg ggc agc aga cag aag aag atc agg ata cag ctg aga tcc	288
Leu His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser	
85 90 95	

cag tgc gcg aca tgg aag gtg atc tgc aag agc tgc atc agt caa aca	336
Gln Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr	
100 105 110	

ccg ggg ata aat ctg gat ttg ggt tcc ggc gtc aag gtg aag ata ata	384
Pro Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile	
115 120 125	

cct aaa gag gaa cac tgt aaa atg cca gaa gca ggt gaa gag caa cca	432
Pro Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro	
130 135 140	

caa gtt taa	441
Gln Val	
145	

<210> 4  
 <211> 146  
 <212> PRT  
 <213> Homo sapiens

<220>  
 <223> xage-1 p16

<400> 4	
Met Leu Leu Trp Cys Pro Pro Gln Cys Ala Cys Ser Leu Gly Val Phe	
1 5 10 15	
Pro Ser Ala Pro Ser Pro Val Trp Gly Thr Arg Arg Ser Cys Glu Pro	
20 25 30	
Ala Thr Arg Val Pro Glu Val Trp Ile Leu Ser Pro Leu Leu Arg His	
35 40 45	
Gly Gly His Thr Gln Thr Gln Asn His Thr Ala Ser Pro Arg Ser Pro	
50 55 60	
Val Met Glu Ser Pro Lys Lys Lys Asn Gln Gln Leu Lys Val Gly Ile	
65 70 75 80	
Leu His Leu Gly Ser Arg Gln Lys Lys Ile Arg Ile Gln Leu Arg Ser	
85 90 95	
Gln Cys Ala Thr Trp Lys Val Ile Cys Lys Ser Cys Ile Ser Gln Thr	
100 105 110	
Pro Gly Ile Asn Leu Asp Leu Gly Ser Gly Val Lys Val Lys Ile Ile	
115 120 125	
Pro Lys Glu Glu His Cys Lys Met Pro Glu Ala Gly Glu Glu Gln Pro	
130 135 140	
Gln Val	
145	

<210> 5  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:immunogenic  
peptide derived from xage-1 14

<220>  
<221> MOD\_RES  
<222> (1)  
<223> Xaa = any amino acid (X-1)

<220>  
<221> MOD\_RES  
<222> (2)  
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>  
<221> MOD\_RES  
<222> (3)  
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>  
<221> MOD\_RES  
<222> (10)  
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 5  
Xaa Xaa Xaa Pro Ser Ala Pro Ser Pro Xaa  
1 5 10

<210> 6  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:xage-1 14,  
immunogenic amino terminal end of xage-1, xage-1  
residues 14-23

<400> 6  
Gly Val Phe Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 7  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:1Y xage-1 14,  
variant of xage-1 14, immunogenic peptide derived  
from xage-1 14

<400> 7  
Tyr Val Phe Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 8  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:2L xage-1 14,  
variant of xage-1 14, immunogenic peptide derived  
from xage-1 14

<400> 8  
Gly Leu Phe Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 9  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:3M xage-1 14,  
variant of xage-1 14, immunogenic peptide derived  
from xage-1 14

<400> 9  
Gly Val Met Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 10  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:1Y2L xage-1 14,  
variant of xage-1 14, immunogenic peptide derived  
from xage-1 14

<400> 10  
Tyr Leu Phe Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 11  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:2L3M xage-1 14,  
variant of xage-1 14, immunogenic peptide derived  
from xage-1 14

<400> 11  
Gly Leu Met Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 12  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 12  
Gly Val Trp Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 13  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 13  
Gly Val Tyr Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 14  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 14  
Thr Val Trp Pro Ser Ala Pro Ser Pro Met  
1 5 10

<210> 15  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 15  
Ser Met Tyr Pro Ser Ala Pro Ser Pro Ile  
1 5 10

<210> 16  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 16  
Ser Val Phe Pro Ser Ala Pro Ser Pro Thr  
1 5 10

<210> 17  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 17  
Gly Val Trp Pro Ser Ala Pro Ser Pro Met  
1 5 10

<210> 18  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 18  
Ser Val Trp Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 19  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 19  
Gly Leu Trp Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 20  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 20  
Ile Val Trp Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 21  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 21  
Gly Leu Ala Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 22  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 22  
Gly Val Ala Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 23  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14



<400> 23  
Tyr Leu Phe Pro Ser Ala Pro Ser Pro Met  
1 5 10

<210> 24  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 24  
Tyr Leu Ala Pro Ser Ala Pro Ser Pro Ile  
1 5 10

<210> 25  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:modified xage-1  
14 peptide, immunogenic peptide derived from  
xage-1 14

<400> 25  
Tyr Leu Ala Pro Ser Ala Pro Ser Pro Val  
1 5 10

<210> 26  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:nucleic acid  
sequence encoding SEQ ID NO:6 native sequence

<400> 26  
ggcgtcttcc catcggcccc ttcgccagtg 30

<210> 27  
<211> 30  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:nucleic acid  
sequence encoding SEQ ID NO:9 preferred form

<400> 27  
ggcgtcatgc catcggcccc ttcgccagtg 30

<210> 28  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence:nucleic acid  
 sequence encoding SEQ ID NO:11 preferred form  
  
 <400> 28  
 ggccattatgc catcggcccc ttcgccagtg 30  
  
 <210> 29  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence:nucleic acid  
 sequence encoding SEQ ID NO:11 preferred form  
  
 <400> 29  
 ggccatcatgc catcggcccc ttcgccagtg 30  
  
 <210> 30  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence:nucleic acid  
 sequence encoding SEQ ID NO:11 preferred form  
  
 <400> 30  
 ggccaatgc catcggcccc ttcgccagtg 30  
  
 <210> 31  
 <211> 30  
 <212> DNA  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence:nucleic acid  
 sequence encoding SEQ ID NO:11 preferred form  
  
 <400> 31  
 ggccatgatgc catcggcccc ttcgccagtg 30  
  
 <210> 32  
 <211> 10  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> Description of Artificial Sequence:xage-1 33,  
 residues 33-42 of xage-1

<400> 32  
Ala Thr Arg Val Pro Glu Val Trp Ile Leu  
1 5 10

<210> 33  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:xage-1 57,  
residues 57-66 of xage-1

<400> 33  
His Thr Ala Ser Pro Arg Ser Pro Val Met  
1 5 10

<210> 34  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:immunogenic  
peptide derived from xage-1 14 where X-1 is Tyr

<220>  
<221> MOD\_RES  
<222> (2)  
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>  
<221> MOD\_RES  
<222> (3)  
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>  
<221> MOD\_RES  
<222> (10)  
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 34  
Tyr Xaa Xaa Pro Ser Ala Pro Ser Pro Xaa  
1 5 10

<210> 35  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence:immunogenic  
peptide derived from xage-1 14 where X-2 is Leu

<220>  
<221> MOD\_RES  
<222> (1)  
<223> Xaa = any amino acid (X-1)

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<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 35
Xaa Leu Xaa Pro Ser Ala Pro Ser Pro Xaa
  1              5              10

<210> 36
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic
      peptide derived from xage-1 14 where X-3 is Met

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 36
Xaa Xaa Met Pro Ser Ala Pro Ser Pro Xaa
  1              5              10

<210> 37
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:immunogenic
      peptide derived from xage-1 14 where X-4 is Val

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

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<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<400> 37
Xaa Xaa Xaa Pro Ser Ala Pro Ser Pro Val
  1               5               10

<210> 38
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created
      from SEQ ID NO:5 by omitting Pro at position 9

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 38
Xaa Xaa Xaa Pro Ser Ala Pro Ser Xaa
  1               5

<210> 39
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created
      from SEQ ID NO:5 by omitting Ser at position 8

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<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 39
Xaa Xaa Xaa Pro Ser Ala Pro Pro Xaa
  1                      5

<210> 40
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:9-mer created
      from SEQ ID NO:5 by omitting Pro at position 7

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 40
Xaa Xaa Xaa Pro Ser Ala Ser Pro Xaa
  1                      5

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<210> 41
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:overall formula
      for 9-mers created from SEQ ID NO:5

<220>
<221> MOD_RES
<222> (1)
<223> Xaa = any amino acid (X-1)

<220>
<221> MOD_RES
<222> (2)
<223> Xaa = Leu, Met, Ala, Ile, Val or Thr (X-2)

<220>
<221> MOD_RES
<222> (3)
<223> Xaa = a hydrophobic residue, Met or Ala (X-3)

<220>
<221> MOD_RES
<222> (7)
<223> Xaa = Pro or absent (X-5), when absent, X-6 is Ser

<220>
<221> MOD_RES
<222> (8)
<223> Xaa = Ser or absent (X-6), when absent, X-5 and X-7 are Pro

<220>
<221> MOD_RES
<222> (9)
<223> Xaa = Pro or absent (X-7), when absent, X-5 is Pro and X-6
      is Ser

<220>
<221> MOD_RES
<222> (10)
<223> Xaa = Val, Met, Leu, Ala, Ile or Thr (X-4)

<400> 41
Xaa Xaa Xaa Pro Ser Ala Xaa Xaa Xaa Xaa
  1             5             10

<210> 42
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence:exemplar
      nucleic acid encoding a peptide of SEQ ID NO:39

<400> 42
ggcgtcttcc catcggtccc ttcggtg

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27

<210> 43  
 <211> 27  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:exemplar  
 nucleic acid encoding a peptide of SEQ ID NO:38

<400> 43  
 ggcggtcttcc catcggtcccc tccagtg 27

<210> 44  
 <211> 27  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Description of Artificial Sequence:exemplar  
 nucleic acid encoding a peptide of SEQ ID NO:40

<400> 44  
 ggcggtcttcc catcggtccct gccagtg 27

<210> 45  
 <211> 637  
 <212> DNA  
 <213> Homo sapiens

<220>  
 <223> complete nucleic acid sequence of XAGE-1 with  
 untranslated 5' and 3' ends

<400> 45  
 gtcgttaatg gggacctggg aaggagcata ggacagggca aggcgggata aggaggggca 60  
 ccacagccct taaggcacga gggaacctca ctgcgcatgc tcctttggtg cccacctcag 120  
 tgcgcatgtt cactgggctgt cttcccatcg gcccttcgca cagtgtgggg aacgcggcgg 180  
 agctgtgagc cggcgactcg ggtccctgag gtctggattc tttctccgct actgagacac 240  
 ggcggacaca cacaaacaca gaaccacaca gccagtccca ggagcccagt aatggagagc 300  
 cccaaaaaga agaaccagca gctgaaagtc gggatcctac acctgggcag cagacagaag 360  
 aagatcagga tacagctgag atcccagtgc gcgacatgga aggtgatctg caagagctgc 420  
 atcagtcaaa caccggggat aaatctggat ttgggttccg gcgtcaagggt gaagataata 480  
 cctaaagagg aacactgtaa aatgccagaa gcaggtgaag agcaaccaca agtttaaatg 540  
 aagacaagct gaaacaacgc aagctggttt tatattagat atttgactta aactatctca 600  
 ataaagtttt gcagctttca ccaaaaaaaaa aaaaaaa 637